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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/613,606

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Ying-Lin Chen

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DUANE MORRIS, LLP

IP DEPARTMENT

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EXAMINER

CHEN, JACK S J

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 09/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/613,606	Applicant(s) CHEN ET AL.	
	Examiner Jack Chen	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12,13 and 15-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12,13 and 15-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

In response to the communication filed on June 18, 2004, claims 12-13, 15-40 are active in this application.

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 12-13, 15-40 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Re claims 12, 22 and 31, the phrases "liner oxides" is not supported by the original specification (it appears that there is only one layer of line oxide); Re claims 13, 30 and 32, the phrase " N_2 *and* H_2 " is not supported by the original specification; Re claim 40, the phrase "wherein a difference of said heights ... is about 600 Angstroms" is not supported by the original

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specification (this limitation appears to be supported by the prior art section, NOT the instant invention).

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 12-13, 15-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claims 12 and 22, the phrase “nitridizing said **exposed surfaces** of said liner oxides so as to form a layer of silicon oxy-nitride overlying said exposed surfaces of said liner oxides” is unclear and indefinite since the gate spacers are formed on the liner oxides (it appears that applicant needed to define the location of the exposed surfaces).

Re claims 12, 22 and 31, the phrase “removing said liner oxides not covered by said gate spacers and said layer of silicon oxy-nitride” is unclear (changing to --removing said liner oxides not covered by said gate spacers and **not covered by** said layer of silicon oxy-nitride—or --removing said liner oxides not covered by said gate spacers and **removing** said layer of silicon oxy-nitride—is suggested).

Re claims 13 and 32, the phrase “said applying nitridation” lacks antecedent basis.

Re claims 13, 30 and 32, the phrase “said first and second surfaces” lacks antecedent basis.

Re claims 13, 20, 28, 30, 38, the phrase “said layer of liner oxide” lacks antecedent basis.

Re claims 15, 23, 33, the phrase “said layer of gate oxide” lacks antecedent basis.

Re claims 16, 24, 34, the phrase “said layer of gate material” lacks antecedent basis.

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Re claims 17, 25, 35, the phrase “said gate material” lacks antecedent basis.

Re claims 18-19, 26-27, 36-37, the phrase “said gate spacer material” lacks antecedent basis.

Re claim 31, the phrase “nitridizing said **exposed surfaces** of said liner oxides so as to form a layer of silicon oxy-nitride overlying **an exposed surface of said gate electrode structure** and said exposed surfaces of said liner oxides” is unclear and indefinite since the gate spacers are formed on the liner oxides (it appears that applicant needed to define the exposed surface of the gate electrode and the location of the exposed surfaces for the liner oxides).

Re claim 31, the phrase “gate electrode structure” lacks antecedent basis.

Re claim 40, the phrase “said heights” lacks antecedent basis.

Re claim 40, the phrase “said gate electrodes” lacks antecedent basis.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 12-13, 15-16, 18, 20-21, 22-24, 26, 28-30, 31-34, 36, 38-39 are rejected under 35 U.S.C. 102(e) as being anticipated by Deshpande et al., U.S./6,512,266 B1.

Due to the 112 problems, as best can be understood by the examiner is as following:

Deshpande et al. Disclose a method for forming a semiconductor device, which comprises providing a substrate 10, a gate electrode 14 formed over said substrate, liner oxides 22/23 with

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exposed surfaces formed over said substrate and on sidewalls of said gate electrode, gate spacers 24 formed on said liner oxides; nitridizing (nitridizing by using plasma-assisted CVD to form the oxy-nitride 28, which inherently shows using nitrogen in order to form oxynitride) said exposed surfaces of said liner oxides so as to form a layer of silicon oxy-nitride 28 overlying said exposed surfaces of said liner oxides (figs. 1E); removing said liner oxides not covered by said gate spacers (figs. 1C-1D or 2D-2E) and removing at least a portion of said layer of silicon oxy-nitride (figs. 1F or 2G; Re claim 22, removing at least a portion of said layer of silicon oxy-nitride substantially without forming undercuts under said gate spacers; Re claim 31, removing at least a portion of said layer of silicon oxy-nitride substantially without forming divots on the liner oxides); and saliciding contact points to said gate electrode (col. 7, lines 17-30), see figs. 1A-2G, cols. 1-10 for more details.

Re claims 13, 30 and 32, Deshpande et al. inherently shows using Nitrogen in order to form oxynitride 28 (Due 112 problems, as best can be understood by the examiner, which is using either nitrogen or hydrogen).

Re claims 15, 23 and 33, Deshpande et al. Show the gate oxide is about 10 to 200 angstroms (fig. 1A, col. 4, lines 14-20)

Re claims 16, 24 and 34, Deshpande et al. show the gate material comprises polysilicon (fig. 1A, col. 4, lines 26-41).

Re claims 18, 26 and 36, Deshpande et al. show the gate spacer material comprising silicon nitride (fig. 1C).

Re claims 20, 28 and 38, Deshpande et al. show the thickness of the liner oxide is about 2 to 400 angstroms (fig. 1B).

Re claims 21, 29 and 39, Deshpande et al. show using cobalt for salicidation process (col. 7, lines 17-30).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 17, 19, 25, 27, 35, 37 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deshpande et al., U.S. 6,512,266 B1.

Deshpande et al. disclosed above (paragraph 7). However, Deshpande et al. is silent to show the thicknesses of the gate material (about 3000-7000 angstroms), gate spacer material (about 2000-3000 angstroms) and the difference of the height of the gate spacer and the spacer. Selecting suitable thicknesses/height for the gate material, spacer material is well known in the art.

Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to use any suitable thicknesses/height for the gate material, spacer material in order to optimize the processes. Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Deshpande et al. by selecting the suitable thicknesses/height for the gate material, spacer material, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Response to Arguments

11. Applicant's arguments filed June 18, 2004 have been fully considered but they are not persuasive.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., Re claim 12, performing a nitride plasma treatment to the exposed surface of the liner oxide) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to applicant's argument that the reference fail to suggest how to remove the oxy-nitride layer substantially without forming undercuts under the gate spacers. The Examiner disagrees because figs. 1E-1F or 2F-2G clearly show this feature (removing the oxy-nitride layer substantially without forming undercuts under the gate spacers. NOTE: the step of removing the oxy-nitride layer does not create the undercuts).

In response to applicant's argument that the reference fail to suggest how to remove the oxy-nitride layer substantially without forming divots on the liner oxides. The Examiner disagrees because figs. 1E-1F or 2F-2G clearly show this feature (removing the oxy-nitride layer substantially without forming divots on the liner oxides. NOTE: the step of removing the oxy-nitride layer does not create the divots).

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Chen whose telephone number is (571)272-1689. The examiner can normally be reached on Monday-Friday (9:00am-6:30pm) alternate Monday off.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W Whitehead can be reached on (571)272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jack Chen
Primary Examiner
Art Unit 2813